

Marine Life Protection Act Initiative



Habitat Evaluations of the Round 1 External Proposed MPA Arrays for the North Coast Study Region

Presentation to the MLPA North Coast Regional Stakeholder Group
March 24, 2010 • Crescent City, CA

Dr. Karina Nielsen, Member • MLPA Master Plan Science Advisory Team



Notes on Round 1 Evaluations

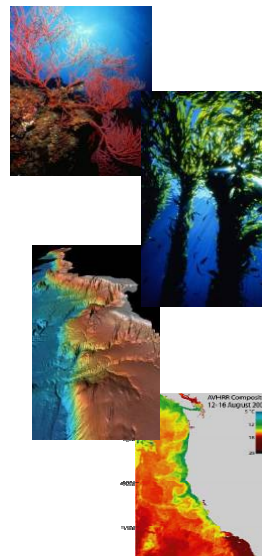
2

- Most External MPA Arrays proposed tribal uses in many MPAs, including otherwise “no-take” areas, but did not specify the types of uses
- The SAT **did not have sufficient information in round 1 to integrate tribal uses in evaluations** (i.e. proposed tribal uses were not considered in assigning levels of protection), **but this will likely change in round 2**
- For the sake of consistency, **SMCAs in ExC** that proposed tribal uses only were **evaluated as SMRs**
- For the purpose of evaluation, **mobile MPAs in ExA were treated as static**, and stewardship zones were not evaluated



MLPA Goals*: Habitats

1. To protect the natural diversity and function of **marine ecosystems**.
2. To help sustain and restore **marine life populations**.
3. To improve **recreational, educational, and study opportunities** in areas with minimal human disturbance.
4. To protect representative and unique **marine life habitats**.
5. Clear objectives, effective management, adequate enforcement, sound science.
6. To ensure that MPAs are designed and managed as a **network**.

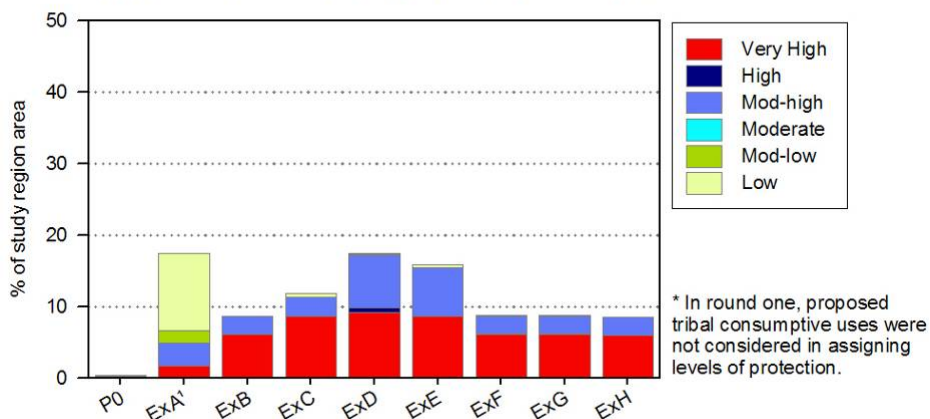


* Note that this language represents a summary of the MLPA goals



Round 1 Arrays by Level of Protection

Comparison of Existing MPAs (Proposal 0) and Round 1 External MPA Arrays by Level of Protection





Habitat Protection Guidelines



Every 'key' marine habitat should be represented in the MPA network to protect the diversity of species that live in different habitats and those that move among different habitats over their lifetime.



'Key' marine habitats should be replicated in multiple MPAs across large environmental and geographic gradients to protect the greater diversity of species and communities that occur across such gradients, and to protect species from local year-to-year fluctuations in larval production and recruitment.



At least three to five replicate MPAs should be designed for each habitat type within a biogeographical region to provide analytical power for management comparisons and to buffer against catastrophic loss of an MPA.



Evaluation: Habitats

Key Questions for Each Draft Array/Proposal

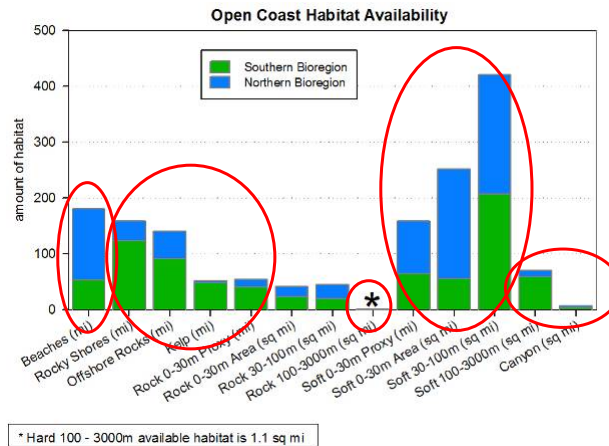
1. How well are key habitat types represented in draft MPA arrays?
2. What are the proposed levels of protection for these habitat types?
3. How well are habitats and levels of protection distributed across the study region?



Habitat Availability and Spacing

7

- Nearshore rocky habitats are less abundant in the northern bioregion
- >100 meter depth habitats are relatively rare across the region, occurring mostly in canyons and the southern bioregion
- Soft bottom habitats are especially abundant in the northern bioregion



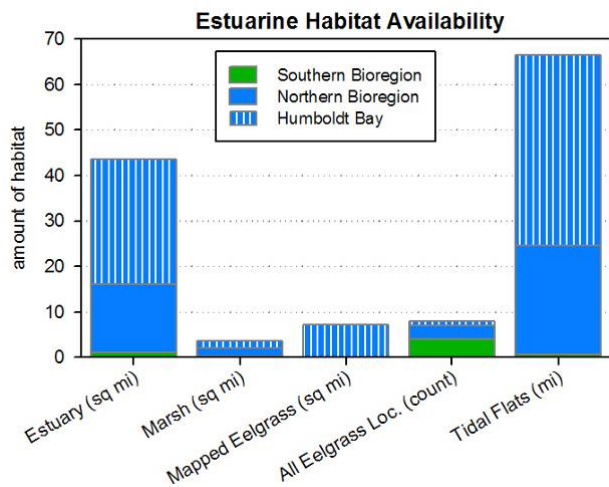
Note: some substrate mapping and 0-30 meter (m) proxy line were not available when external MPA arrays were developed



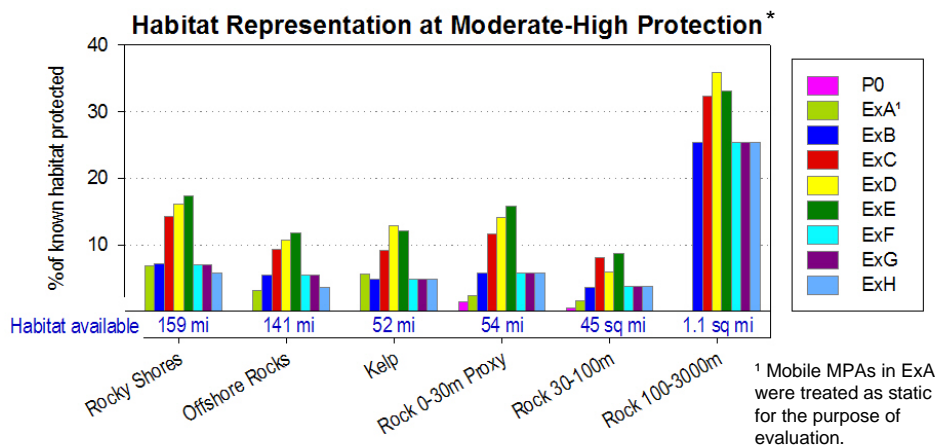
Results: Habitat Availability

8

- The northern bioregion contains the majority of estuarine habitats:
98% of estuarine area
96% of marsh area
99% of tidal flats
- Humboldt Bay contains 62% of all estuarine area and 100% of mapped eelgrass in the MLPA North Coast Study Region (NCSR)
- Eelgrass is known to exist in 8 estuaries, 4 in the northern and 4 in the southern bioregions



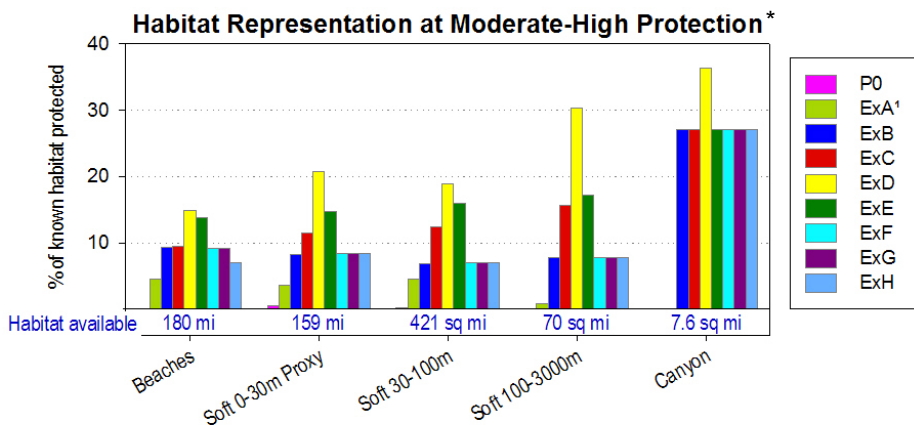
Results: Habitat Representation



- ExC, ExD and ExE include larger proportion of rocky habitats in MPAs as compared to other arrays

* Evaluated for all MPAs at or above moderate-high protection

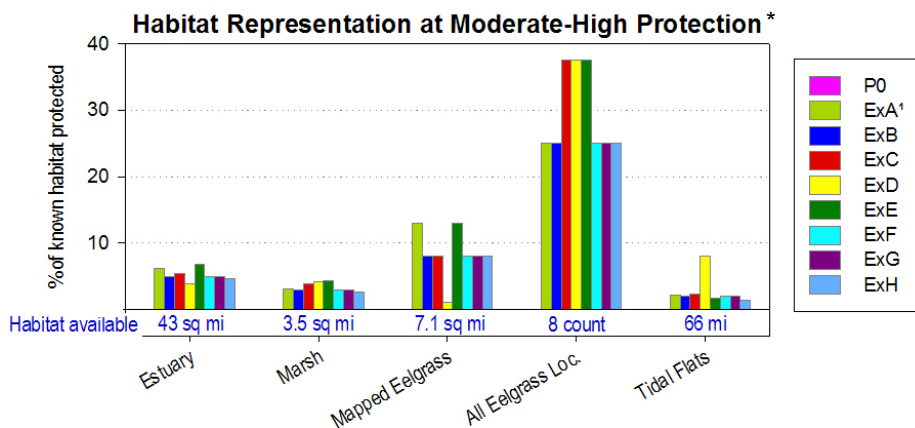
Results: Habitat Representation



- ExC, ExD, and ExE generally include larger proportion of soft-bottom habitats in MPAs as compared to other arrays
- On average, arrays include larger proportion of soft-bottom habitats as compared to rocky habitats

* Evaluated for all MPAs at or above moderate-high protection

Results: Habitat Representation



- All arrays include very high protection MPAs in south Humboldt Bay and Ten Mile River estuary
- All arrays except ExH include at least one additional estuary in southern bioregion above moderate-high protection (ExC and ExD include two)

* Evaluated for all MPAs at or above moderate-high protection

Representation Example: Rocky Habitats



Kelp

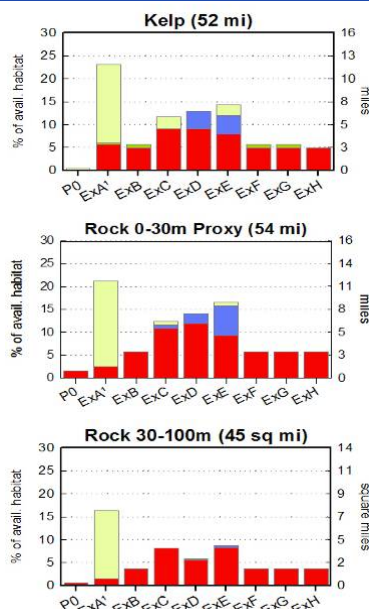
- 5-13% of kelp at or above mod-high protection
- ExC, ExD and ExE include largest proportion of kelp at or above mod-high protection

Rock 0-30m

- 2-16% of 0-30m rocky reef at or above mod-high protection
- ExC, ExD and ExE include largest proportion of 0-30m rock at or above mod-high protection

Rock 30-100m





- 2-9% of 30-100m rock at or above mod-high protection
- ExC, ExD and ExE include largest proportion of 30-100m rock at or above mod-high protection





Results: Habitat Representation

Summary






-  In general, ExC, ExD and ExE include larger proportion of open coast habitats in MPAs at mod-high protection as compared to other arrays
-  Similar configurations in ExB, ExF, ExG and ExH lead to similar habitat representation
-  ExA includes large proportion of habitats in low protection MPAs
-  Ranking of proposals by average representation at or above mod-high protection across all habitats:

$$\text{ExD} > \text{ExE} > \text{ExC} > [\text{ExF} \ \& \ \text{ExG}] > [\text{ExB} \ \& \ \text{ExH}] > \text{ExA}$$



Methods: Habitat Replication

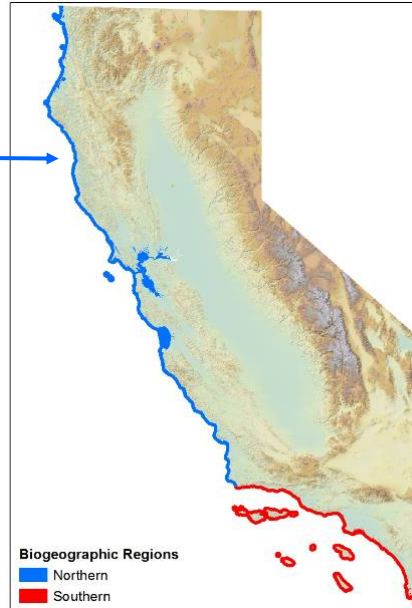
Guidelines for Replication

-  3-5 replicates of habitat per biogeographic region (i.e., from Point Conception to the California-Oregon border)
-  SAT recommends at least 1 replicate of each habitat in each of the two north coast bioregions, if possible
-  MPA or cluster must meet the minimum size guidelines (9 square miles).
-  Habitat must meet the threshold identified to encompass 90% of biodiversity in that habitat type
-  Estuarine MPAs do not have to meet size guidelines but must contain at least 0.12 square miles of estuarine habitat



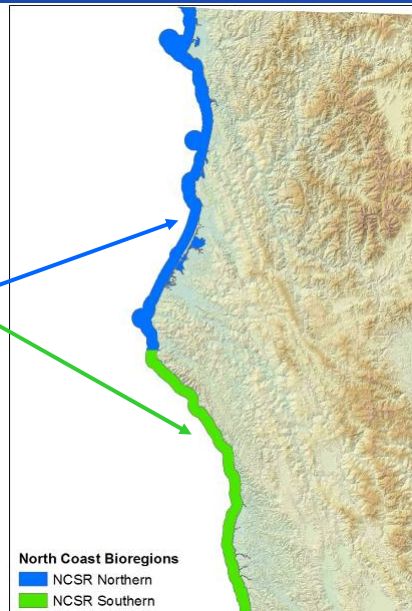
Replication Guidelines

- Replication guidelines in the *California Marine Life Protection Act Master Plan for Marine Protected Areas* call for 3-5 replicates within the MLPA **biogeographic region**



Replication Guidelines

- Replication guidelines in the *Master Plan* call for 3-5 replicates within the MLPA **biogeographic region**
- The SAT additionally recommends at least 1 replicate of each habitat per **bioregion**
- Two **bioregions** in the north coast study region





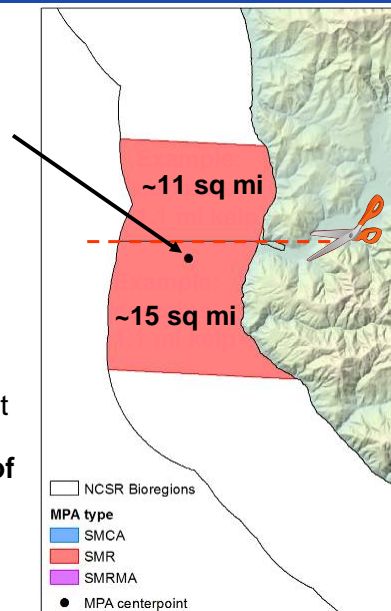
Replication Guidelines

- Replication guidelines in the *Master Plan* call for 3-5 replicates within the **biogeographic region**
- The SAT additionally recommends at least 1 replicate of each habitat per **bioregion**
- Two **bioregions** in the north coast study region
- No strong biological break at Point Arena, thus the **southern bioregion of the NCSR extends into the northern half of the MLPA North Central Coast Study Region**



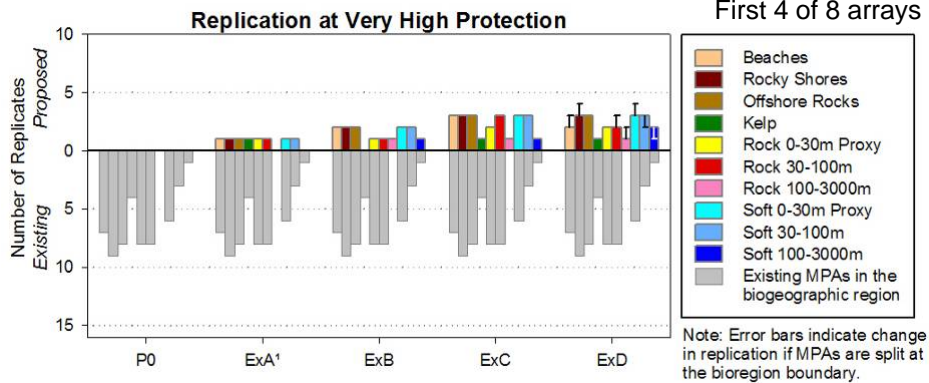
Habitat Replication and Bioregions

- For an MPA that falls across the bioregional divide, the MPA **centerpoint** determines which bioregion habitat replicates will be assigned to.
- If the MPA includes at least 9 square miles in each bioregion, the MPA **can be "split" into two at the bioregion boundary**.
- To count as 2 replicates, habitats must be **included in sufficient quantity** to count as a replicate **on BOTH sides of the bioregion divide**





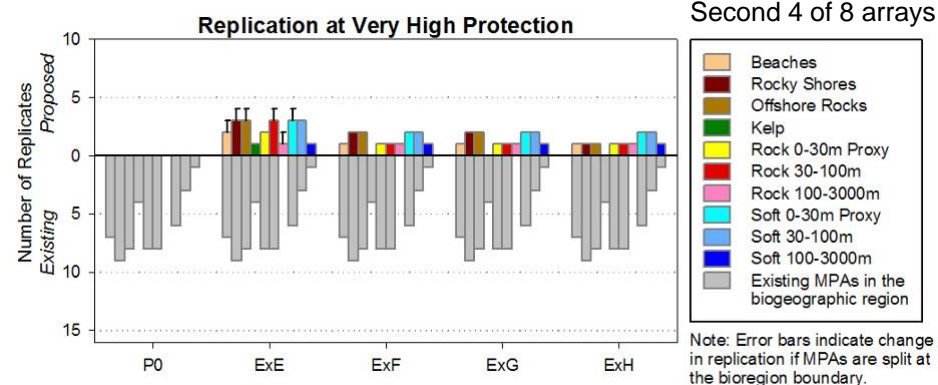
Replication: Very High Protection



- For most habitats, 3-5 replicates already exist elsewhere in the biogeographic region (north central and central coast study regions)
- All arrays include 1-3 replicates of most habitats
- In ExD, splitting MPAs at the bioregion boundary would increase replication for some habitats and decrease replication for others



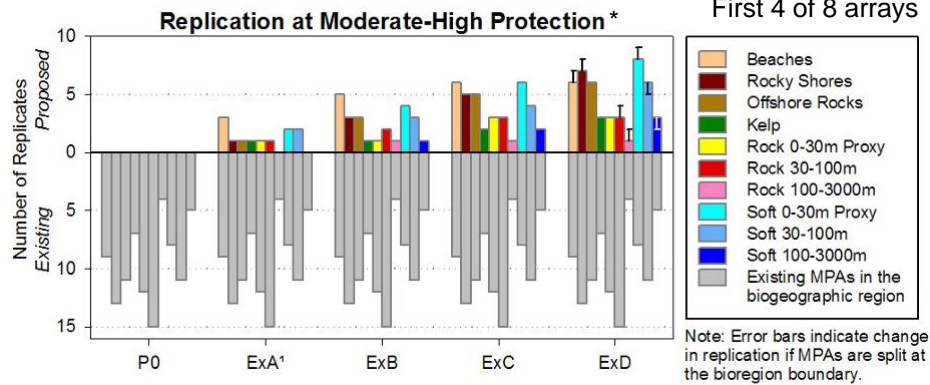
Replication: Very High Protection



- For most habitats, 3-5 replicates already exist elsewhere in the biogeographic region (north central and central coast study regions)
- All arrays include 1-3 replicates of most habitats
- In ExE, splitting MPAs at the bioregion boundary would increase replication for some habitats



Replication: Mod-High Protection

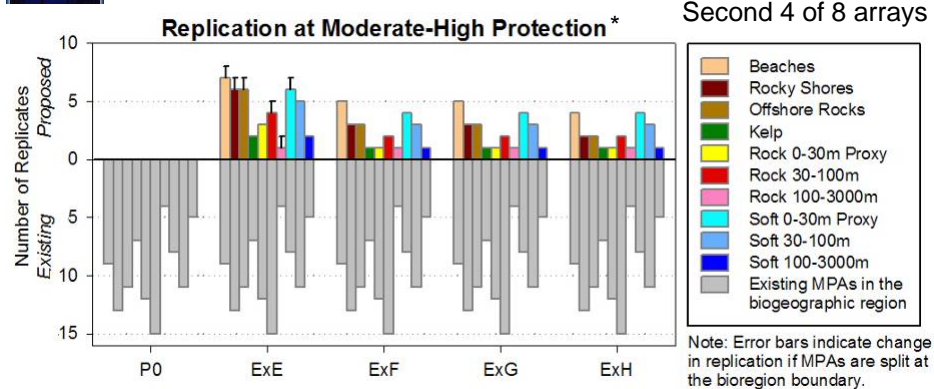


- ExC and ExD generally include more habitat replicates than other arrays

* Evaluated for all MPAs at or above moderate-high protection



Replication: Mod-High Protection

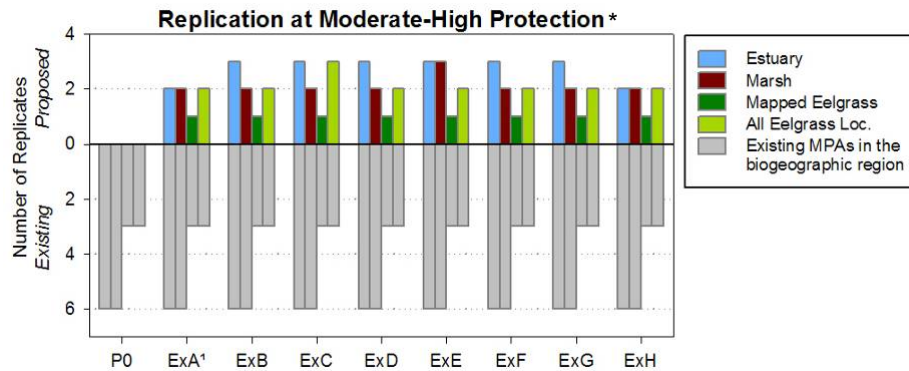


- ExE generally includes more habitat replicates than other arrays

* Evaluated for all MPAs at or above moderate-high protection



Replication: Estuarine Habitats



- All proposals include 2-3 replicates of estuary, and coastal marsh, and eelgrass locations
- All proposals include 1 replicate of mapped eelgrass in Humboldt Bay

* Evaluated for all MPAs at or above moderate-high protection



Rocky Habitat Replication by Bioregion

Number of bioregions with at least 1 habitat replicate

a	Rocky Shores (2 possible)			Offshore Rocks (2 possible)			Kelp (2 possible)			Rock 0-30m Proxy (2 possible)			Rock 30-100m (2 possible)			Rock 100-3000m (2 possible)*		
	VH	H	MH	VH	H	MH	VH	H	MH	VH	H	MH	VH	H	MH	VH	H	MH
P0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
ExA ¹	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
ExB	2	2	2	2	2	2	1	1	1	2	2	2	2	2	2	1	1	1
ExC	2	2	2	2	2	2	1	1	1	1	1	1	2	2	2	1	1	1
ExD	2	2	2	2	2	2	1	1	1	1	1	1	2	2	2	1 (2)	1 (2)	1 (2)
ExE	2	2	2	2	2	2	1	1	1	1	1	1	2	2	2	1 (2)	1 (2)	1 (2)
ExF	2	2	2	2	2	2	1	1	1	2	2	2	2	2	2	1	1	1
ExG	2	2	2	2	2	2	1	1	1	2	2	2	2	2	2	1	1	1
ExH	2	2	2	2	2	2	1	1	1	2	2	2	2	2	2	1	1	1

* A replicate of rock 100-3000m is only available in one location, spanning the bioregion boundary.
Note: Parenthesis () indicate the number of bioregions with replicates if MPAs are split at the bioregion boundary.

- Existing MPAs in the north central coast region contribute to bioregional replication for all rocky habitats except rock 100-3000m
- None of the arrays replicate kelp in the northern bioregion or rock 0-30m north of Punta Gorda
- Rock 100-3000m is only available in 1 location, right near the bioregion boundary



Soft Bottom Replication by Bioregion

Number of bioregions with at least 1 habitat replicate

b	Beaches (2 possible)			Soft 0-30m Proxy (2 possible)			Soft 30- 100m (2 possible)			Soft 100- 3000m (2 possible)		
	VH	H	MH	VH	H	MH	VH	H	MH	VH	H	MH
P0	1	1	1	0	0	0	1	1	1	0	0	0
ExA ¹	1	1	2	1	1	2	1	1	2	0	0	0
ExB	2	2	2	1	1	2	2	2	2	1	1	1
ExC	2	2	2	2	2	2	2	2	2	1	1	1
ExD	1 (2)	1 (2)	2	2	2	2	2	2	2	1	1	1
ExE	1 (2)	2	2	2	2	2	2	2	2	1	1	1
ExF	2	2	2	1	1	2	2	2	2	1	1	1
ExG	2	2	2	1	1	2	2	2	2	1	1	1
ExH	2	2	2	1	1	2	2	2	2	1	1	1

Note: Parenthesis () indicate the number of bioregions with replicates if MPAs are split at the bioregion boundary.

- Existing MPAs in the north central coast contribute to bioregional replication for beaches and 30-100m soft bottom
- Only ExC, ExD and ExE replicate soft 0-30m in both bioregions at very high protection
- All arrays replicate beaches, soft 0-30m and soft 30-100m in both bioregions at mod-high protection
- None of the arrays replicate soft 100-3000m in the northern bioregion



Estuarine Replication by Bioregion

Number of bioregions with at least 1 habitat replicate






c	Estuary (2 possible)			Marsh (2 possible)			Mapped Eelgrass (1 possible)			All Eelgrass Loc. (2 possible)		
	VH	H	MH	VH	H	MH	VH	H	MH	VH	H	MH
P0	1	1	1	1	1	1	0	0	0	1	1	1
ExA ¹	2	2	2	2	2	2	1	1	1	2	2	2
ExB	2	2	2	2	2	2	1	1	1	2	2	2
ExC	2	2	2	2	2	2	1	1	1	2	2	2
ExD	2	2	2	2	2	2	1	1	1	2	2	2
ExE	2	2	2	2	2	2	1	1	1	2	2	2
ExF	2	2	2	2	2	2	1	1	1	2	2	2
ExG	2	2	2	2	2	2	1	1	1	2	2	2
ExH	2	2	2	2	2	2	1	1	1	2	2	2

- Existing MPAs in the north central coast contribute to replication of estuaries, marsh, and eelgrass locations
- All arrays replicate all estuarine habitats across all possible bioregions at very high protection



Results: Habitat Replication

Summary

-  All habitats already replicated in at least 3-5 MPAs at or above mod-high protection elsewhere in the biogeographic region (north central coast or central coast)
-  On average, ExD, ExC and ExE provide largest number of replicates of open coast habitats at or above mod-high protection
-  None of the arrays replicate kelp or 100-3000 soft bottom in both bioregions at or above mod-high
-  All arrays replicate all estuarine habitats across all possible bioregions at very high protection
-  Ranking of arrays for replication across all habitats at mod-high protection:
$$\text{ExD} > \text{ExE} > \text{ExC} > [\text{ExB}, \text{ExF} \ \& \ \text{ExG}] > \text{ExH} > \text{ExA}$$